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Effect of Preoperative Steroid Injection on Wound Drainage after Modified Radical Mastectomy

Asma Aziz, Muhammad Waqas Arshad, Muhammad Shahzeb Asghar

Abstract

Objective: The aim of this study was to determine the Effect of Preoperative Steroid Injection on Wound Drainage after Modified Radical

Study Design and Setting: The current Quasi-experimental study was carried out at the department of surgery Ibn e siena hospital and research institute Multan and Bakhtawar Ameen Medical and Dental College Multan for a period of six months from January, 2023 -June, 2024 after taking permission from the ethical board of the hospital.

Methodology: A total of 62 females with breast cancer, planned for modified radical mastectomy were included. The patients were assigned computer-generated numbers to form two equal groups, A and B. An hour before to surgery, group A received a 120 mg a day (3 ml) injection of depomedrol, while group B received 3 ml of regular saline. The same consultant surgeon conducted MRM on both groups using the same dissection technique, which is steel scalpel dissection. Two suction drains, one at the breast site and one at the axillary area, were positioned at the end of the treatment. Data was analyzed through SPSS 25.

Results: In our study, 48.3% females were diagnosed with stage II, and 51.7% had stage I breast cancer. In a modified radical mastectomy, a single preoperative steroid dose reduced mean drainage volume more than control. (P=0.048)**.**

Conclusion: Our findings showed that that the preventive steroid injections prescription in women following modified radical mastectomy were more effective in lowering mean drainage volume for female participants with stage I and II breast cancer when compared to normal saline.

Key words: Steroid injections; Mastectomy; drainage volume

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INTRODUCTION

One of the most prevalent cancers in women is breast cancer, also known as CA breast (CAB), which is thought to kill one out of every four women. The data on CAB in Pakistan is imprecise since fewer instances are reported, but a thorough analysis of the statistics indicates that CAB accounts for 34.6% of female cancers. CAB accounts for 23% of all malignancies in postmenopausal women.[1] In Pakistan, the prevalence of CAB is increasing. Modified radical mastectomy (MRM), one of the available treatment options, is performed with the goal of curing the condition. More than 35% of patients had morbidity following surgery, including increased seroma development and wound drainage.[2] Following MRM, a number of conditions are recommended to lessen drainage and the likelihood of seroma development. Postoperative drainage in MRM can be decreased by using pressure dressings, flap fixation methods, OK-432, preoperative steroid injections, and ultrasonic scalpels.[3-6] Steroids may reduce the development of seromas and decrease inflammation in the injured region. In certain procedures, the steroids have been given intermittently to reduce localized wound leakage. A randomized controlled experiment was carried out by Khan, M. A. (2017, to examine the impact of a single steroid injection dosage on postoperative drainage following MRM. The findings indicated that the steroid group had less drainage than the control group, with the steroid group having 755.4 ± 65 ml and the control group having 928.3 ± 102.5 ml (p value <0.005).[7] Increased seroma production and wound drainage are invariably linked to morbidity, including infections, delayed healing, and hospital discharge. Chemotherapy or radiation therapy may be delayed as a result of the healing delay. There is just one research in Pakistan.[2] Regarding this particular subject, there is little

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national and international information available. The combination of surgery, radiation, hormonal therapy, and chemotherapy has been the primary treatment strategy for breast cancer in recent years. However, surgery is essential. Among all surgical techniques for locally advanced breast cancer, modified radical mastectomy (MRM) with axillary lymph node clearing (ALND) is frequently used. Following MRM, surgeons face a number of postoperative surgical site problems, with seroma production being one of the most common, occurring at an incidence rate of 3-85%.[4] Fluid accumulation in the axilla and post-mastectomy skin flap after breast cancer surgery is known as seroma formation in the dead space. It often begins on the seventh postoperative day, peaks on the eighth, and gradually decreases until the sixteenth day, when it largely goes away on its own[5]. It is also possible to think of or hypothesize that after extensive tissue dissection, lymphatic leakage builds up in the dead space, and that inflammatory responses during the acute phase of wound healing during postsurgical procedures promote the development of seroma.[6] Following tissue damage, pro-inflammatory cytokines including interleukin (IL)-1b, IL-6, and tumor necrosis factor (TNF) alpha are produced, along with anti-inflammatory cytokines like IL-10. Later on, an imbalance of them causes infectious problems. Seroma fluid is gathered in the dead space after thorough tissue dissection and axillary clearing. Over the course of the next several days, this fluid's composition changes. Because of the disintegration of blood arteries and lymphatics, it first looks like clots of blood with clear lymph. It turns into an exudate a few days later as a result of inflammatory changes. The accompanying morbidity, including flap necrosis, wound dehiscence, infection, longer hospitalization, increased expense, and many physician visits, may cause adjuvant cancer therapy to be delayed, even though it was not classified as a life-threatening disease. [7] Nowadays, a variety of methods are used to decrease dead space and lessen seroma development. These include the use of sutures, suction drains, bandages for compression, ultrasonic scalpels for dissection, sclerotherapy, topically applied tranexamic acid, and fibrin glue for fixing flaps. [8-14] Methylprednisolone succinate was administered intravenously (IV) prior to surgery in a randomized pilot trial to monitor seroma development. Following MRM, there was a decrease in the amount of seroma generation as well as the number of seroma aspirations and drainage volume after surgery.[15]

Therefore the current study was carried out to find out the Effect of Preoperative Steroid Injection on Wound Drainage after Modified Radical Mastectomy.

METHODOLOGY

The current Quasi-experimental study was carried out at the department of surgery Ibn e siena hospital and research institute Multan and Bakhtawar Ameen Medical and Dental College Multan for a period of six months from January, 2023 -June, 2024 after taking permission from the ethical board of the institute (Ref no: 027/ERC/024, date: 26/01/2024) . Female patients between the ages of 30 and 60 who were scheduled for MRM are included in the inclusion criteria. A total of 62 females with breast cancer and were planned for modified radical mastectomy were included. The age of the study population was from 30 to 60 years. Individuals with long-term medical comorbidities and those who were already taking steroids, those who had previously received radiation, and pregnant or nursing mothers were not excluded . After each patient was admitted, formal informed consent was obtained. A thorough history, a clinical examination, and pertinent investigations were used to evaluate the patient. The pre-anesthesia workup and assessment were completed. The patients were assigned computer-generated numbers to form two equal groups, A and B. An hour before to surgery, group A received a 120 mg a day (3 ml) injection of depomedrol, while group B received 3 ml of regular saline. The same consultant surgeon conducted MRM on both groups using the same dissection technique, which is steel scalpel dissection. Two suction drains, one at the breast site and one at the axillary area, were positioned at the end of the treatment. Every patient received the same routine preoperative and postoperative treatment. After the drain was taken out, the volume of the drain was measured using operational criteria. A custom created proforma that is attached as Annexure A contains all of the data. Data was analyzed by SPSS 14. The mean and standard deviation was used to express the quantitative variables of age, BMI, illness duration, and drainage volume. The stage of illnesses (qualitative variable) was reported as frequency and percentage. The independent sampling t test was used to compare the drainage volumes of the two groups. Age, BMI, disease duration, and disease stage were among the factors that were stratified and then further examined using the independent sample t test. A P value of less than 0.05 was deemed significant.

RESULTS

Over all 62 females participated in this study whose mean body mass index was 26.9±3.38 kg/m2, and symptom mean duration was 1.6±0.62 years. The drainage volume in A group was 573±116.63 ml, whereas in B group was 1020 ± 159.9 ml. 48.3% were diagnosed with stage II breast cancer, and 51.7% had stage I. When the mean drainage volume (in milliliters) of the two groups was compared, it was found that in individuals having a modified radical mastectomy, a single preoperative steroid dose reduced mean drainage volume more than control. This variance was noteworthy (t-test value 4.078 and P value was 0.048). Table 1. There was no impact of these effect modifiers on the mean drainage volume for age, Body mass index, period of symptoms, and illness stage using independent t-test as shown table (2-5).

Table 1. Comparison of the Mean Drainage Volumes of the Two Groups by Independent T-Test

Groups	Frequency	Mean± standard deviation	T test	
A	31	573±116.63	F	Significance
B	31	1020±159.9	4.078	0.048

Table 2. Age's Impact on Mean Drainage Volume.

Age groups	Frequency	Mean± standard deviation	T test	
Early Middle Age	25	879.5±221.3	F	Significance
Late Middle Age	37	823.6±226	0.001	0.978

Table 3: Effect of body mass index on Drainage Volume

Category of BMI	Frequency	Mean± standard deviation	T test	
normal BMI (20-25 Kg/m 2)	22	841.7±221.9	F	Significance
Abnormal BMI (>25 Kg/m2)	41	848±227.9	0.001	0.978

Table 4: Results of Disease Duration Using Mean Drainage Volume

Disease duration	Frequency	Mean± standard deviation	T test	
Short duration less than one years	25	824±239.6	F	Significance
Long duration more than one year	37	860.5±215.1	0.001	0.978

Table 5: on Mean Drainage Volume the effect of Breast Cancer Stage

Disease stage	Frequency	STD and mean	T test	
Stage 1	32	815.9±235.9	F	Significance
Stage 2	30	878±209.7	0.041	0.840

DISCUSSION

More than 1 out of 10 new cancer diagnoses in women are for breast cancer, making it the most prevalent disease diagnosed in this population.[1] According to the International Agency for Research on Cancer (IARC), 6.3 million women have survived breast cancer in the past five years, whereas 1.7 million new instances of the disease were recorded in 2012.[7 In] 2018, the number of fatalities from breast cancer grew to 14%, while the incidence of the disease climbed to more than 20%. [8]. Furthermore, compared to its neighbors, Pakistan has a roughly 2.5-fold greater incidence of breast cancer [9]. Contrary to what is seen in the West, one intriguing element about Pakistan is the participation of younger women in CAB. Surgery is a crucial step in the multimodal management of CAB, which is aided by hormone treatment, chemotherapy, and radiation therapy. Modified radical mastectomy (MRM) with axillary clearance is thought to be the most often used surgical technique.[8] Numerous intraoperative and postoperative issues can arise from AB surgery, making it a complicated procedure.

With a frequency of 35–80%, seroma development is the most prevalent of these problems.[10–14] Preventing seroma development is crucial because it leads to longer hospital stays, drawn-out outpatient follow-ups, and delays in later adjuvant treatments, all of which worsen patient suffering.[15] It is very controversial if steroids can stop seroma production. The current study found that the mean drainage amount in the normal saline group were 1020 ml, but the mean draining volume of women who underwent the modified radical mastectomy procedure and received an injection of steroids an hour before was 672 ml.This difference between the groups was statistically significant (value of P equal to 0.048). The drainage volume significantly lower among people with stage 1 breast cancer, those with a normal BMI (20–25 kg/m2), those in the age group 46–60 years and those with a short illness duration (<1 year). Nevertheless, these results were not statistically significant (p>0.05).

There has been a lot of data in recent years that suggests seroma is not only a simple deposit of serous fluid but rather an exudative discharge that results from acute inflammation following surgical trauma. [16]. This idea is supported by the seroma fluid's cytokines and proteinases and their inhibitors.[17] According to evaluations, immunomodulatory substances are useful in halting the development of seroma [18]. One such drug was 5-fluorouracil in a rat model, and sapylin was utilized in a human model. Therefore, steroids are also effective anti-inflammatory medicines that can be used to manage seroma. Glucocorticoids are commonly given as

local intramuscular injections or intraarticular injections to treat a variety of inflammatory disorders, including rheumatic fever, as well as allergy problems. The effectiveness of steroids was also assessed in a variety of surgical procedures, including neck and scalp surgery, cosmetic surgery, heart surgery, and colon resection. In an RCT, Taghizadeh and colleagues.[19] evaluated the impact of steroids on seroma recurrence following breast reconstruction utilizing the latissimus dorsi. Following the first aspiration of the seroma, the authors administered a single dose of triamcinolone to one group while normal saline to the other group, and they monitored for recurrence.[19] and observed findings that were comparable to those of the current investigation, namely that patients who got steroid injections had lower mean drainage volumes than those who got normal saline. The number of punctures, total volume of fluid drained, and time it took for a seroma to form were all statistically significantly reduced when Axelsson et al. [9] matched the effects of injecting local steroids in the mastectomy cavity with normal saline at the time of drain removal. Furthermore, Qvamme et al.[12] carried out a randomized controlled research wherein participants having mastectomy received a single steroid injection in one group and normal saline in another.. They also reported a noteworthy decrease in the drainage volume in the steroid group as compared to normal saline. Khan et al. (2017) found that in the steroid group the mean drainage was 749.4±64 via. 928.3±102.5 ml, correspondingly, substantially lower than that of the control group.[2] These results are consistent with a recent study that shown that when administered prophylactically to patients having modified radical mastectomy, steroids are superior to normal saline in terms of decreased drainage volume.

Using a similar method on a rat model, Turel et al.[15] injected methylprednisolone into the area beneath the skin flaps following mastectomy and axillary lymph node removal. Although administering steroids was successful in avoiding seroma development and decreasing drainage volume, the author disclosed that due to the significant risk of wound infection, it should not be done frequently. Similar to what Turel et al.[15] found, our investigation showed a decrease in drainage volume within the steroid group. In a controlled experimental study, Okholm et al. assessed whether a single intravenous dosage of glucocorticoids administered half and one hours before to surgical procedure was helpful in avoiding seroma development following axillary dissection and mastectomy.[20] There was a small drop in the drainage volume, total seroma volume, and number of seroma punctures during the first 2 postoperative days. The authors came to the conclusion that there was no discernible decrease in drainage volume following steroid administration. The findings of Okholm and colleagues differs with the findings of our study, which showed that patients who received preventive steroids saw a considerable decrease in drainage volume.[25] According to the current study, individuals having a modified radical mastectomy benefit from preventive steroid injections. However, as steroids can raise the risk of infection, the danger of wound infection must be considered while handling such instances. In order to limit drainage volume and lower the incidence of seroma development, steroids must be administered in conjunction with a sufficient prophylactic antibiotic cover. Seroma development is still a significant and inevitable issue after mastectomy for breast cancer surgery, despite all the advancements in surgical technique.[21] Seroma formation has been linked to higher patient morbidity. Because of the connected drains, it has also been linked to restrictions in the ipsilateral side hand's range of motion and general mobility. [22] Cytokine release is a hallmark of the systemic inflammatory response that surgery causes. Serous fluid rises as a result of enhanced fibrinolytic activity in the days that follow. Thus, the etiology of seroma is thought to involve a build-up of immunoglobulin (IG), inflammatory cells, and elevated IL-6 during the exudative phase of the inflammatory response. [23-24] Inhibiting the inflammatory response with steroids may reduce seroma development and perhaps enhance the patient's quality of life after mastectomy. By blocking the function of cytokines, they may be employed to stop the inflammatory process. As IL-6 levels in seroma fluid decreased, it was shown that local injection of 80 mg of triamcinolone significantly decreased the development of seroma after abdominal surgery. Clinically, a decrease in seroma accumulation was correlated with the suppression of inflammatory markers. [25] Similarly, the use of triamcinolone injections during breast reconstruction surgery showed that 55% of patients did not develop seromas. Conversely, among those given 0.9% normal saline, 95% had seroma development. [26] One hour before to surgery, women receiving MRM were given a preoperative single dose of 8 mg IV dexamethasone in another controlled clinical study. Improved pulmonary functions, a decrease in the need for analgesics and antiemetic medications, and a low frequency of postoperative nausea, vomiting, and pain were all seen. Additionally, only one patient in the control group had seroma development, whereas none in the intervention group. [27] A research on the decrease of auricular seroma after blunt trauma damage was also carried out. Triamcinolone acetate was injected intralesionally after the seroma was first aspirated. The recurrence of seroma was decreased by this one minimally invasive technique. [28] Similarly, a research that employed an injection of 120 mg depo-medrol prior to MRM revealed that the intervention group saw a 6% decrease in seroma incidence, whereas the control group experienced an 18% decrease.[29] The present research has various limitations since it did not track the equipment used for dissection, the patient-controlled analgesia administered, or the size and volume of the tumor dissection. In addition, the sample size was little. To confirm and corroborate the present findings, more study should take all these aspects into account.

CONCLUSION

Our findings concluded that that the preventive steroid injections prescription in women following modified radical mastectomy were more effective in lowering mean drainage volume for female participants with stage I and II breast cancer when compared to normal saline.

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Authors Contribution:
Asma Aziz: Primary researcher, conception, acquisition, analyzing the data and writing manuscript
Muhammad Waqas Arshad: Primary researcher, conception, acquisition, analyzing the data and writing manuscript
Muhammad Shahzeb Asghar: Primary researcher, conception, acquisition, analyzing the data and writing manuscript

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